EDUCATION - PARTNERSHIP EVENT REPORT AND RECOMMENDATIONS

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Event: **26th Annual ESRI User Conference (UC) and 6th Annual ESRI Education User Conference (EdUC) - San Diego, California – 4-11 August 2006.**

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1. Executive Summary

The 26th Annual ESRI User Conference and the 6th Annual ESRI Education User Conference fostered an excellent time of networking, gaining technical skills, and the fostering of new and the nurturing of existing partnerships across private industry, government, education, nonprofit organizations, and among individuals, all seeking to use GIS as a tool for understanding our communities and our world.

From enormous banners….

… to individuals making a difference in their communities, as in these 4-H students, above, geography, spatial thinking, and GIS are evident in everything the ESRI User Conference and the ESRI Education User Conference stand for.

The largest geographic information systems (GIS) conference in the world, the 26th Annual ESRI Conference, took place from 5 to 11 August 2006, at the San Diego Convention Center and adjacent Marriott Hotel, above.

This event brought over 13,500 people together from almost every conceivable employment sector together, from 127 countries, representing tribal, federal, state, and local governments, industry, nonprofit, academia, K-12 education, news media, and other sectors. The 6th annual Education User Conference (EdUC) took place during the first 4 days of the UC, and attracted 650 educators.

Both of these conferences give the clearest indication in society about the diversity of GIS applications, the growth of Geographic Information Sciences, the high degree of enthusiasm from the GIS user community (1,200 user papers, 100 special interest group meetings, dozens of regional user group meetings), and the growth of GIS over the past 24 years. The 1,000 ESRI staffpersons at the conference also reflected the diversity of talent in the GIS industry today.

I encourage everyone that is involved with any sort of work having to do with our planet to attend the ESRI UC at least once in your lifetime. You will be humbled, amazed, and encouraged, all at the same time. You won't regret it.

Where else besides the ESRI EdUC and UC can one learn about the power of spatial thinking and GIS in literally every major sector of society, at a

multitude of scales from local to global, taking place all around the world? Where else can one meet authors of textbooks and journal articles that we have read, or receive training from those who developed the software we are using?

Such is the nature of the ESRI UC – it is at once fascinating and a wealth of information. It gives one a sense that all of us using GIS are not just making a living at it, but we are also contributing to knowledge about our planet and, ultimately, we are making a positive impact on its resources and people. This knowledge about the Earth is becoming more and more critical each year as we face growing 21st Century problems of water quality and availability, energy use, biodiversity loss, urban sprawl, poverty, crime, terrorism, climate change, natural hazards, and much more.

Above, networking with educators in New Zealand and Australia. Many of them had attended our GeoTech Colorado GIS Institute for Educators during the previous week, and it was a pleasure to work with them.

The ESRI UC and EdUC are incredible learning and networking experiences. The contacts gained here and the relationships and partnerships nurtured often last for years or even decades after the conference ends.

The events are also quite humbling. I often feel by the end of the UC that my knowledge about GIS after over 20 years of work in this field is really quite limited after all. The good news is that we're all learning and moving forward!

2. Related Reports

Conference highlights, from ESRI: http://www.esri.com/events/uc/index.html

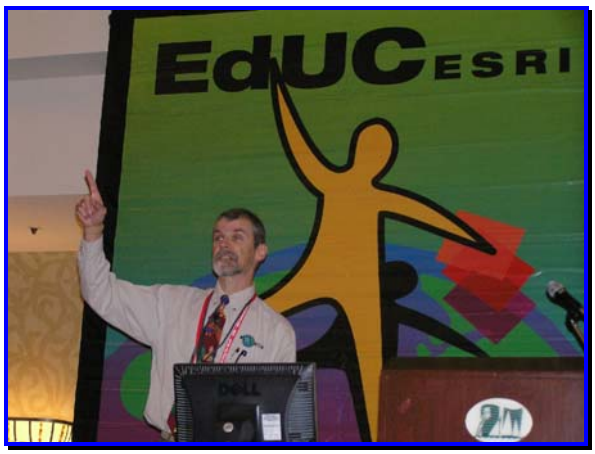
Directions Magazine's perspective on what's new: http://www.directionsmag.com/article.php?article_id=2257

My other ESRI conference reports for previous years can be found under the "news" link on the USGS Education Portal, on: http://education.usgs.gov, or directly on: http://education.usgs.gov/common/resources/success_stories.html

Or, you may email me at jjkerski@usgs.gov for additional information about the conferences or about GIS in education.

The conference proceedings are on: http://www.esri.com/library/userconf/archive.html

3. EdUC Overview



*Charlie Fitzpatrick, ESRI K-12 Manager, kicks off the ESRI EdUC. Not only is the content and networking at the conferences extremely valuable, but in addition, if one wants to see how a conference **should** be conducted, I recommend that person should attend the ESRI EdUC and UC. After having attended and witnessed the operation of 20 conferences annually for the past decade, in my opinion, the ESRI sets **the** standard of excellence in excellence in conference logistics.*

Since 2001, the EdUC has been held at the San Diego Convention Center, running immediately before and concurrently with the first half of the UC. The EdUC runs from Saturday through Tuesday, and offers a forum for people who are teaching, writing curriculum, conducting educational research, and supporting education. This forum includes those in universities, community colleges, technical-vocational institutions, secondary, and primary schools, as well as those in nonformal settings ranging from after-school clubs to national program such as 4-H.

Dr. Alan Carroll, Chief Cartographer from National Geographic, gave a fascinating keynote address, incorporating politics, geography, cartography, and education.

The fact that this conference has been successfully held for 6 years in a row should lay to rest any notion that GIS is confined to a few school districts, universities, or isolated teachers. The EdUC featured three half days of workshops, presentations, and an education exhibition.

It has been my pleasure to attend most of the annual Education User Conferences, including the first one at the California State University-San

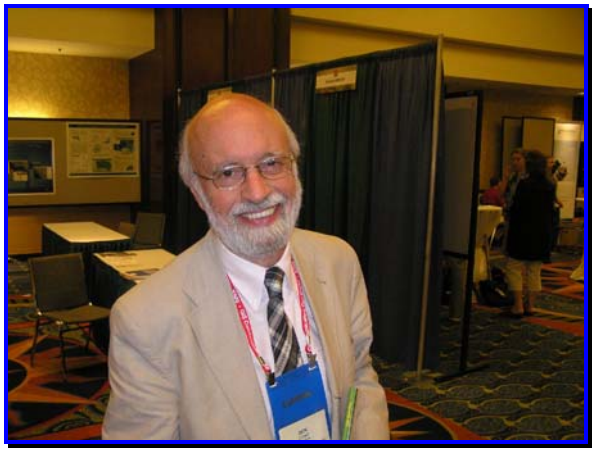
Bernardino, as well as the 1998 GIS in Education conference at Eastern Michigan University. The original GIS education conference was sponsored by TERC in 1994, and was followed by conferences in 1996 and 1997. This year, the size of the EdUC increased to nearly 800, with 50 states and 35 countries represented.

The number of researchers and practitioners interested in teaching with GIS, in a content area such as environmental science, geography, history, science, or mathematics, is growing, but still forms a relatively close-knit community. Therefore, it is not difficult to understand why many people knew each other at this conference, and why it has such a "family" feel to it. It was excellent to further these relationships as well as form new ones. These people are interested in teaching and learning and are passionate about what they do.

Sessions at the conference included presentation, hands-on workshops in data, tools, and software, and other items of interest to the educational community. Approximately eight tracks were run simultaneously over the duration of the conference.

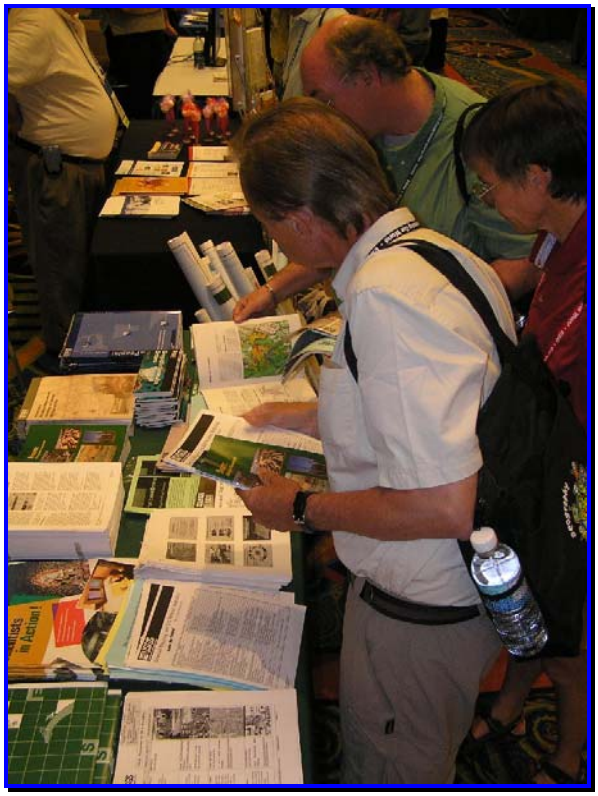
4. EdUC Expo

The EdUC Expo included over 30 exhibitors operating exhibits for 6 hours on Saturday afternoon. In addition, a special designation of "Friends of GIS Education" that pointed EdUC attendees to those exhibitors in the Main User Conference who offer educational products, programs, and support.



I was extremely impressed to see Don Cooke, President of TeleAtlas, staffing the exhibit at the EdUC and spending so much time with the educators. I use his book Fun With GPS *in most of my workshops.*

Joseph Kerski and Steve Predmore set up staffed the USGS exhibit in the EdUC Expo. I wish to thank Steve for all of his able and expert assistance—he really went above and beyond the call of duty.



We distributed maps, posters, guidelines, information sheets, teachers packets, booklets, and much more at our USGS Exhibit in the EdUC Expo.

5. Why GIS in Education?

Many factors encourage educators to pursue and integrate GIS and spatial thinking in education. This includes teaching *with GIS* and teaching *about GIS,* and the factors include:

- Recent US Department of Labor emphasis and grants concerning the shortage and critical nature of geospatial technology jobs in the 21st Century.
- Technological innovation
- Constructivism
- Integrated, authentic practice
- Authentic assessment
- School-to-career movement and funding
- School-to-community emphasis
- Active, student-centered learning
- National, state, and district content standards (but this can also be a challenge to inquiry-based teaching)
- Public accountability demands for education
- Globalization
- Inquiry emphasis
- Information literacy
- Computer literacy
- Professional societies.
- Universities.
- Private companies, especially GIS companies, particularly ESRI.
- Government agencies' outreach staffs such as the USGS.
- Research groups (CIPE, TERC, UMAC).
- Advances in data availability and usability, particularly web-based mapping services.
- Advances in hardware capability.
- Advances in software capability.

From a learning perspective, GIS is highly praised. Lessons around the world illustrate community-based, fieldwork based, interdisciplinary, open-ended projects involving ill-structured problems with real-world data. These projects help students use the same tool as is used in research and business to enhance motivation and learning, explore the world, and provide real employment skills.

From a teaching perspective, some challenges remain, such as:

• GIS is a complex, open-ended tool.
• Teachers teaching *with* GIS must process data as well as develop lessons.
• Increasing complexity of teachers' jobs and demands on teachers' time.
• A lack of geographic training and thinking in both teachers and students.
• Inadequate time to learn software.
• Although a growing library of lessons exist, they do not exist for every subject area and every ability level.
• Lack of training, funds, and technical support.
• Insufficient openings in curriculum for GIS.
• A lack of incentives for teachers.

Teachers ideally need to be paired with at least one other teacher in the school for increased likelihood that these methods will "take root," and they need some start-up lesson plans, and training. In my survey of 1,520 teachers, training was cited as the number one need.

GIS alters communication patterns and traditional roles of students and teachers, for example:
• Coaching
• Small group instruction
• Working more closely with weaker students
• Assessment based on products and progress
• Cooperation

Students with GIS may learn at different rates and not all learned the same content or skills. With GIS, there is a shift from *covering* material to *sampling* material. There is another shift from unilaterally *declaring* what is worth knowing to *discovering* what is important. Students are examining processes over space and time.

In applying Binko's (1989) 4 stages of learning to GIS: awareness, understanding, guided practice, and implementation, GIS is still in the awareness phase for most teachers. In the diffusion literature (championed by Everett Rogers), GIS is in use by the "early adopters"—the ESRI Press books *Mapping Our World* and *Community Geography* have done much to spread the use of GIS in the curriculum.

GIS implementation is not rapid because it still relies on inservice training. Therefore, the USGS and others need to address what future teachers are learning in colleges of education in universities and in community colleges.

The NAS report on GIS in K-12 Education was published in 2006, and I am hopeful that this document, *Learning to Think Spatially,* provides high-level support for the integration of spatial analysis throughout the curriculum.

There is great educational value in requiring students to "dig out" information, rather than handing it to them. GIS involves data management skills and a whole host of other skills besides spatial analysis. It is one of the few tools to take advantage of many computer skills, relational skills, and content skills.

The teacher's role is critical to learning with GIS, and training teachers needs to be emphasized, particularly the preservice teachers. Teachers are more likely to adopt GIS if they have previous computer experience, a problem-solving approach, a geographic perspective, a positive attitude toward work change, and active networking and communication skills.

In my opinion, the emphasis must not be on "How to get GIS into the curriculum," but "How can GIS enhance teaching and learning in the curriculum?"

6. EdUC Workshops and Presentations

I conducted or co-conducted the following presentations and workshops at the EdUC: (1) Online learning with GIS (with Anita and Roger Palmer), (2) Core Essentials of GIS in Education; and (3) Mining Spatial Data from the Internet (with Angela Lee, ESRI).

I also attended the following workshops and sessions: Establishing the Vision in Schools, Starting and Keeping GIS in Schools, Model Builder, ArcWeb Business Services, and Geodatabase Creation and Use.

I was quite excited to see so many attendees at the paper sessions and workshops.

Attendees at our hands-on workshop. Angela Lee and I created a lesson where participants had to download and use USGS and Census data to determine the optimal location for a fire warning siren tower in San Diego County.

Above, Dr Bob Kolvoord leads our Research in GIS Education special interest group meeting. We also had a full house at our GIS Education Curriculum meeting.

7. User Conference Plenary

The ESRI conference theme for this year was "Communicating Our World."

Jack Dangermond (above) with one of my all-time favorite quotes, which I first read on a teacher's E-mail signature block. Mr Dangermond shared his excitement about people not only sharing their spatial data and research results, but now, with new tools, are able to share their models and procedures, improving them, with others from across the planet. It is clear that he doesn't want GIS to be an "insiders-only" club, but rather, he urges the attendees to bring geography and spatial analysis to benefit all peoples and societies.

Former US Senator Bob Kerry, keynote speaker.

Opening Day is one of the few times when almost everyone at the conference is together in one room--probably close to 13,000 people. ESRI staff and others conduct professional presentations, with excellent graphics, lighting, and sound. It is an amazing event, and one gets the sense that even though we work in separate cubicles around the world, we are part of something global, something quite exciting, something that can help make the world a better place.

Mr. Dangermond is humble about what has been his and ESRI's pivotal role in geographic information science since the 1960s. ESRI, now over 35 years old, has around 5,000 employees, hundreds of thousands of users on its virtual campus, over thousands of business partners, and millions of software seats.

A few of the things we saw in the plenary session that impressed me included the advancements in cartographic editing, the handy new tools in ArcGIS 9.2, the 3D modeling advancements, and ArcGIS Explorer.

8. Awards

Those who know me won't be surprised when they hear that the student presentations are always my favorite part of the plenary session. In the past, winners of the Community Atlas award were featured. This year, above, a selected group of 4-H students discussed what they do across the country and in their communities with scientific inquiry, GPS, and GIS. Esther Worker is the ESRI coordinator of the 4-H Geospatial Program, and together with USDA Coordinator Tom Tate, they and the students are working on numerous innovative projects: http://www.esri.com/industries/k-12/4-h/index.html

It is excellent to know that some of our education efforts have these results. However, we're just planting the seeds. It is these students, their teachers, and their principal who are an inspiration to us all. THEY are the real heroes!

Above, Dr Bob Coulter receives this year's Special Achievement in GIS award for Education, for his work with the Missouri Botanical Garden.

Above, Esther Worker (ESRI) and I stand with Bob Coulter. It has been a sincere pleasure to have worked with him over the years.

9. UC Sessions Attended

Many of us take advantage of the ESRI UC's technical presentations to learn about ESRI software from the experts—the ESRI staff themselves.

I attended the following technical sessions:

1) 3D Analyst geoprocessing tools
2) Tips and Tricks on ArcMap.
3) What's New in ArcGIS 9.2
4) ArcGIS Business Analyst
5) Geostatistics Explained

One of my favorite things about this year's EdUC and UC was the active presence of 4H members and their supporters.

The 4-H students held a reception where they discussed their varied and innovative projects.

ESRI and National 4H formed an agreement to support geospatial technologies in 4H programs. We held a GPS-GIS workshop at Salt Lake Community College (see

http://rockyweb.cr.usgs.gov/public/outreach/reports/ncge03t.pdf) and it was a pleasure to talk with these enthusiastic and intelligent students. Above, Chris Shearer and Alan Carroll from National Geographic listen to the students' presentations.

The 4-H exhibit adjacent to the Map Gallery.

The USGS held an "all hands" meeting where we discussed ArcGIS license issues, the Enterprise Geographic Information Science program, and other programs of interest to the over 100 USGS staffpersons who were present at the conference.

I also met with Ming Tsou on his GIS in education project at San Diego State University, and other colleagues.

10. Exhibit Hall

The ESRI UC exhibit hall is really more than a series of booths highlighting the latest tools, data, projects, hardware, and software. Actually, "booths' is the wrong word, as many of the exhibits are like miniature cities or islands. About 22 rows of 20 exhibitors each are set up – perhaps up to 500 exhibitors total -- representing some of the most creative GIS minds from around the world. It would take a week to fully walk through and appreciate it all.

The exhibit hall is also a demonstration theatre and a place where users can receive personal technical support, ESRI product islands including education, desktop GIS, mobile GIS, developer, server, natural resources, telecommunications, public safety, government, jobs, and much more.

The Defense, Emergency Response, and Homeland Security exhibits were vast this year, and particularly impressive was the above fire response vehicle.

Joseph Kerski between two of the dozens of large maps on display in the Exhibit Hall. These were new USGS geologic and hazards maps of San Francisco, and another was our revised edition of This Dynamic Planet.

Above, the 3-D models that this plotter can create were almost unbelievable.

I do not think that even photographs like these capture the magnitude of the UC exhibit hall. The products, services, and resources on display

showing the application of GIS into every sector of society is truly magnificent, for example, these digital graphics displays, above.

The Spatial Outlet featured new books, and also interesting geography-related items such as shirts, posters, maps, and more. An added bonus was the preponderance of 70s music that they played!

One of two clever geography quizzes created with imagery from Digital Globe, Inc.

11. USGS Exhibit

The USGS has exhibited at the UC each year since 1998. Prior to that and continuing to the present day, the USGS has participated with paper presentations and maps in the map gallery since the conference's inception in 1980. I would estimate at least 100 USGS staffpersons attended the ESRI UC.

The USGS exhibit occupied 30 feet of the Federal Showcase, and was organized and staffed by Liz Colvard, Christy Ryan, and Leslie Gordon of our USGS Menlo Park office, and aided by numerous other USGS professionals.

Our exhibit featured information on how to use USGS data within ESRI GIS software, the National Map Corps, how to use the National Map and other USGS resources, new products and services, and free maps, posters, and books, including urban growth, biodiversity, wildfire analysis, lake floor modeling, earthquake studies, and more. We appreciate all that the ESRI staff did to support our exhibit.

Above, Liz Colvard speaks with attendees at the conference who came to the USGS exhibit to ask technical and data access questions.

Our goal at the ESRI UC is to reflect applications and use of GIS at the USGS, rather than simply the base data we produce. We also seek cooperative research and development agreements, and production agreements with those we come into contact with. The role of geographic data, partnerships, and research is central to the USGS.

Our exhibit included Internet hookups so we could demonstrate our seamless data portals. The most frequent questions were on how to format our data to use with ESRI software, such as NED, and NHD. The staffpersons were well equipped to handle the technical nature of this audience. They had experience in using and manipulating USGS data, were familiar with data and services from all disciplines, and were those who work well with the public. We have a great many of these individuals at the USGS, and I am proud to work with them. Furthermore, each person's "discipline depth" and experience in GIS to their own projects creates a seamless presence and enhances our overall effectiveness.

This conference's exhibit once again was a joint venture between numerous USGS disciplines and centers. This showed how effective a seamless outreach effort can be.

Family night is one of my favorite times to work at the exhibit as it gives us an opportunity to talk with the general public. Friends and family of attendees can tour the exhibit hall and map gallery. This is a good model that brings GIS into the larger community, and one that I advocate that all conferences include, whether they are GIS conferences, science conferences, technology conferences, or other events. Let's spread the enthusiasm of what we know to those "outside our own circle."

12. Map Gallery

The map gallery becomes bigger and better each year, with thousands of applications from amazingly creative people worldwide, spilling over from the sail area above to adjacent halls and rooms in the convention center. Each conference attendee received the latest impressive annual Map Book from ESRI, filled with some of the best of these maps.

This "Making a Better World" display was actually composed of imagery and maps!

Above, impressive 3D globe!

I believe that a short walk through the Map Gallery would do more to convince the world of the power of geography and GIS than any lecture or presentation that I or anyone else could give. Above, the president of Solid Terrain Mapping shows a "miniature" version of the British Columbia 3D map.

13. USGS Map Gallery

Once again, the USGS hosted a large area of the Map Gallery, including 80 maps from USGS scientists and Internet connections to display our online resources. This was made possible through the support of ESRI and the dedication of Barb Ray, Bob Pierce, Jennifer Sieverling and Jacque Fahsholtz (above), and others from the USGS who have been working for months to set up this display.

Joseph Kerski next to two of my posters entitled "Native American Partnership Success Stories" and "Why We Do What We Do." These, along with the 2 other posters I had on display featured a few of the educational partnerships we have been privileged to be a part of—with ESRI, the Missouri Botanical Garden, with Sinte Gleska University, and many more.

14. Special Events

Above, Alex Philp, right, with 2 students. Alex, President of GCS Research, has always been extremely supportive of education, stemming from when I met him when he was an instructor at the University of Montana. GCS was named Business Partner of the Year for the second year in a row. Alex invited me to the GCS reception, which I greatly appreciated as another networking opportunity.

On Thursday, we held a USGS All-Hands meeting. This was a brief but excellent time of networking with many USGS staffpersons that we only see once a year—at the ESRI Conference. We discussed the Regional Geographic Information Office, the Enterprise GIS Program, and other programs of the USGS,

ArcGIS licensing, training, map portals, and other developments.

15. Acknowledgements

To make working at a conference the size of the ESRI UC a success requires a team effort working over many months. I commend the USGS exhibit planning staff, particularly Liz Colvard and Leslie Gordon and the others, and all the USGS employees who helped staff the exhibit. I thank USGS hydrologist and GIS specialist Steve Predmore for his excellent help with materials and staffing for the EdUC Expo.

I salute Jennifer Sieverling, Jacque Fahsholtz, Steve Predmore, Steve Char, Bob Pierce, Barb Ray, and others for organizing the USGS Map Gallery and all the others who took part by producing and displaying their maps and posters.

16. Recommendations

My top recommendation is that we place high priority on developing a single national map portal that contains ALL of our geospatial holdings, in a format that is easy to download, useful to data users, and has a back-up FTP site in case of malfunction or slow Internet connectivity.

By participating in the conference, we sought to demonstrate the leadership that the USGS has in geospatial standards, research, The National Map, and in digital data such as NED and Aster that users can and have used in their work. We sought to further our partnerships on many levels, particularly in regards to The National Map.

I believe that the customer networking, ties to key organizations, and issues raised at this conference are important to the future of the USGS, and it was important to be involved. I thank the Enterprise GIS Team who funded my attendance at this conference.

How does GIS in education fit into the goals and mission of the USGS, and how can the USGS contribute to such an agenda? Our "Future Science Directions" and our USGS strategic plan each indicate how GIS in education ties into our mission. Our emphasis is integrated information for societal needs. GIS provides one of the best tools and science for integrating land-based information.

The National Map and our research projects show that we need scientists who can analyze data from a variety of disciplines. Integrated studies are recommended by education scholars in K-12 curricula also, rather than the traditional model of separate subjects that do not overlap. In 2000, a National Research Council study identified 8 critical world environmental themes, and I believe that 6 of them require spatial data and a populace that can interpret such data.

Data from the USGS Customer Satisfaction-Outcome Survey showed that for 18 products, an average of

55% of the customers reported that they use our products for educational use.

I believe we must continue to support GIS in education by participating in and conducting GIS training for educators, creating GIS-based lessons using USGS and other spatial data resources, and by participating in GIS Day and other activities.

By participating in this conference, we demonstrated the leadership that the USGS has in international science and geography literacy. We are the one of the largest producers and one of the largest users of digital spatial geographic data. These are data sets not only used by geographers, but by anyone interested in solving a project that has to do with space—hydrologists, biologists, demographers, seismologists, geologists, sociologists, psychologists, environmental planners, public works officials, marketers, business analysts, and others. Someone has stated that if physics was the science of the 20th Century, then geography will be **the** science of the 21st.

In my opinion, this wealth of data that we create at the USGS (or any organization) won't be worth much unless we proactively collaborate to improve geographic and scientifically literacy.

One reason for attending these conferences was to illustrate USGS strength in integrating science with education. The growth in geographic technology presents an excellent opportunity for the USGS to get our data and products into the hands of students and educators across the country. Students familiar with our data will form an expanded USGS user base.

We also sought to inform the educational and scientific community that our strength does not end with maps and digital cartographic data, but it includes hazards, water resources, energy, and biological research, for example.

We all look forward to returning to San Diego for the 27th ESRI User Conference, 18-22 June 2007. The call for papers opens up at the end of August 2006!

Partnerships—that's what it's all about, and forming and maintaining them is one of the key reasons why attending the ESRI EdUC and UC is so valuable.

Disclaimer

Note that this report contains my own

personal observations and opinions that do not necessarily reflect the opinions of the USGS. If any errors exist in these notes, they are the result of my own misinterpretation and do not reflect the high quality of the presentations.

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****End of 2006 ESRI EdUC and UC Report****